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The Turkey Breeding Flock

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By E. Y. SMITH

Breeding Quarters and Equipment

Housing

BREEDING turkeys require from 10 to 12 feet of floor space per bird. They can stand low temperatures, but are very susceptible to adverse ventilation that causes wet litter. The regular 20-by-20-foot Cornell poultry house is large enough for 25 to 30 turkey breeders, and a

few of these houses are still in use in New York State. Most operators, however, prefer larger houses because they are easier to keep warm, less expensive to build on a per bird basis, easier to ventilate, and, when properly constructed, save labor in caring for the birds.

Remodelled barns can be used as



Figure 1. Winter quarters once used on a northern New York turkey farm. These birds did not lay until late spring, but their fertility and hatchability were good.

breeder quarters and, when the remodelling can be done by farm labor, may be relatively low in cost. When, however, all labor must be hired, such buildings may be expensive. Apparently fewer multiple-story buildings are being used because many are inefficient from the standpoint of labor. Feed and litter must be carried up and the eggs must be carried down from four to six times a day. Moving the heavy breeding turkeys to the top floors at the beginning of the year and back down again at the end of the year not only requires considerable labor but valuable birds are injured in moving. The removal of dirty litter at the end of the year requires considerable hand labor; and when the upper floors are scrubbed, the water seeps through to the lower floors also. There is little doubt that some barns have been converted into multiple-floored breeding quarters when it would have been more economical to have kept them as they were for storage and other uses and to have built new large one- or two-story buildings for the breeding turkeys.

If new buildings are needed, it is advisable to construct one large breeder house rather than numerous small ones. These houses should be from 36 to 40 feet wide and as long as required for the desired number of turkeys. An alleyway from 4 to 6 feet wide may be constructed along one side or through the center. When relatively large breeding flocks are maintained, this

alleyway may be along one side; when pedigreeing and progeny testing are practised, the alleyway should be through the center. The alleyway permits the operator to enter any one pen without walking through another and prevents the breeders of one pen from getting mixed with those of another. Furthermore, daily feeding and management of the breeders, as well as the collection of the eggs, is easier. The initial cost of movable partitions that permit a manure spreader to be driven through the building may be somewhat high, but the use of a spreader saves labor.

The size of the breeder compartments or pens depends upon the size of the breeder groups. For example a 10-by-14- or 10-by-16-foot compartment is large enough for 12 hens and 1 tom. Some operators have as many as a few hundred breeders in one large pen. Such a pen should be large enough to provide from 10 to 12 square feet for each breeder bird.

The compartments should be separated by solid walls or partitions to about 3 feet from the floor to prevent the turkeys from looking into other compartments. This not only prevents toms from fighting through the partitions, but lessens the problem of preferential mating. The upper part of the partitions may be of slats or preferably of mesh wire because the wire allows better distribution of light in the pens and provides better ventilation which helps to keep the litter drier.

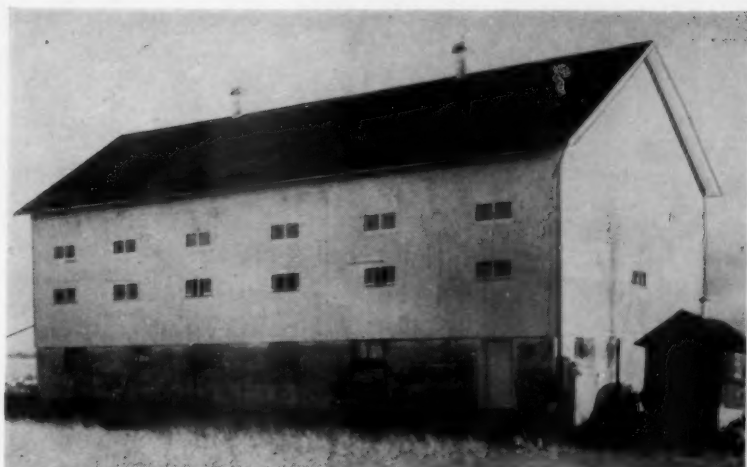


Figure 2. A remodeled barn. This barn once used for dairy cattle makes a good turkey-breeding barn. The drive-in on the second floor is convenient.



Figure 3. A long-type breeding house. A good house, good feed, and good management are conducive to early egg production and hence early poults. Poults may be produced any month of the year.



Figure 4. Good feeders

Above. This metal feeder has a capacity of about 1000 pounds. It may be used for grain or pellets for either a breeder flock or for young birds on range. The rain guards may be removed when used inside. It is not satisfactory for dry-mash feeding. A similar type but with vertical sides would be preferable for dry-mash feeding.

Below. An inexpensive, easy-to-build homemade mash or grain feeder. Could be improved by a wider and lower pitched roof.

The turkey breeding house should be widely separated from the hatchery and from the brooding quarters. A correct ventilating system is important and should be carefully planned before building or before starting to remodel an old building. Ventilation is discussed in detail in Cornell Extension Bulletin 315, *The Ventilation of the Poultry Laying Houses*.

Equipment

Each breeding house should have an adequate and readily available feed and water supply. In multiple-floor houses there should be, rat-, mice-, and dust-proof storage facilities on each floor. Water should be piped to each floor, and preferably to each pen. A soil heating cable or some other way to keep the temperature of the water in the pipes at or above 50°F. is necessary for best results. Small electric immersion water heaters are usually needed in each individual pen fountain. Minutes spent in planning these supplies at the beginning may save hours of labor in caring for the birds and give added assurance that the birds will be given adequate daily care. Provisions should also be made for the disposal of waste water and for washing the equipment. Broody coops are needed to care for the broody hens.

The breeding house must be properly wired to supply light for the birds, for the convenience of the caretaker, and to prevent the water from freezing. Before wiring

the house, one should consult an electrician and plan a larger rather than a smaller wiring system than recommended. This means a saving in current consumption and provides for additional outlets if and when they are needed.

Each pen should have separate feeders for mash, grain, shell, and grit; a drinking fountain; roosts; nests; and a broody coop unless one is provided elsewhere. One should always keep in mind convenience, for convenience not only means a saving of labor but a greater assurance that the labor will be done. The feeders and fountains for individual pens should be so arranged as to keep the feed and water clean. This is an important advantage of the swinging metal feeders that tend to prevent the birds from scratching the feed out onto the litter where it, with contamination, may be picked up by the birds. They minimize the amount of litter that gets into the feed hoppers and, even more important, are relatively rat proof. The shell and feed hoppers are perhaps most often neglected. Dirty shell or grit may be a source of disease contamination and is not conducive to optimum consumption.

Wooden feeders, if used, should be constructed to prevent the turkeys from walking in the feed and from raking the feed out with their beaks. Two-inch lips nailed inside and flush with the upper edges of the feeders reduce the amount of feed wasted. The lips should be

bevelled along the side attached to the feeder so they incline down and toward the inside of the feeders. Feed falling on them slides back into the feeders. About 30 linear feet of feeder space ($\frac{2}{3}$ for mash and $\frac{1}{3}$ for grain) and 10 linear feet of fountain space are enough for 100 turkeys.

Opinions differ as to the need for roosts in the breeding pens, but the writer recommends them because the breeders like roosts and roosts tend to reduce both floor egg laying and broodiness.

In the peak of the laying season, 8 nests may be necessary for each 12 trapnest hens. Even then, some birds may need to wait for their turn at the nests. For flock-mated birds, 1 nest to each 3 or 4 hens will usually be enough.

The long tray-type nests so commonly used may be objectionable, as turkeys are inclined to crowd into one place causing broken eggs. For flock-mated birds, a better type nest is one similar to that used for trapping birds except that the fronts permit hens to enter and leave at will, yet prevent them from entering an occupied nest. Such nests should be on or near the floor rather than in tiers.

Selection of Breeders

THE type of turkey one is able to put on the market is determined largely by the type of turkey selected for the breeding pens. In developing the "ideal" turkey, and in breeding for it, the viewpoints of

both the producer and the consumer should be kept in mind. The best type is that which produces most economically the kind and quality of meat most in demand by the current markets. As the demands of these markets change, our breeding objectives must change also.

The two general classes of trade are the family trade and the restaurant, hotel, railroad dining car, and steamship-line trade. The family trade in New York State ordinarily (though there are exceptions) prefers a high-quality oven-ready carcass that weighs from 12 to 16 pounds. This is indicated by a consumer survey conducted by the New York State turkey producers. A survey of the entire country by the National Association of Chain Stores indicates a large demand for 8- to 10-pound turkeys of average to good quality at lower prices for family use. The restaurant, hotel, railroad dining car, and steamship-line trade pay a premium for high-quality oven-ready carcasses that weigh 25 pounds or more. This trade is rapidly learning that the big broad-breasted thick-meated carcasses not only supply finer meat but more pounds of it per pound of carcass.

Preferred Type

Turkeys selected for breeding should be vigorous and active, bright and alert of eye, and have smooth, glossy plumage. Activeness on the part of the male is extremely important. Their bodies should



Figure 5. White Holland carcasses. The better ones of the lot were selected for this photograph. Contrast these with selected carcasses of the modern meat type turkeys shown in figure 6.

be broad, deep, of moderate length, and thickly fleshed.

The keel should be of moderate length, straight, and parallel with the back except for a slight curve upward at the rear. The breadth of

the breast and the length of the keel have much to do with the appearance of the dressed carcass. A mental picture of the dressed carcass should be kept in mind while selecting the breeders (figure 7) and only

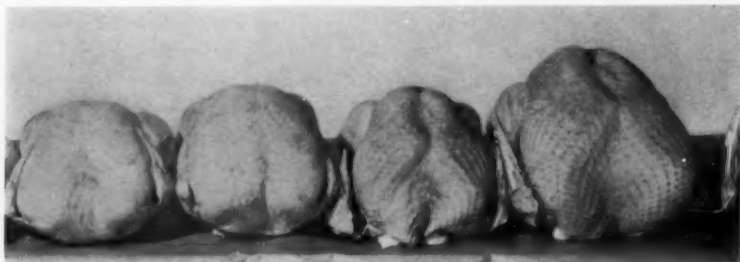


Figure 6. Top-quality turkey carcasses. Regardless of size, where produced, or what label it may carry, to be *top quality* it must be thick-meated, full fleshed, full finished, and perfectly dressed, drawn, and packaged.

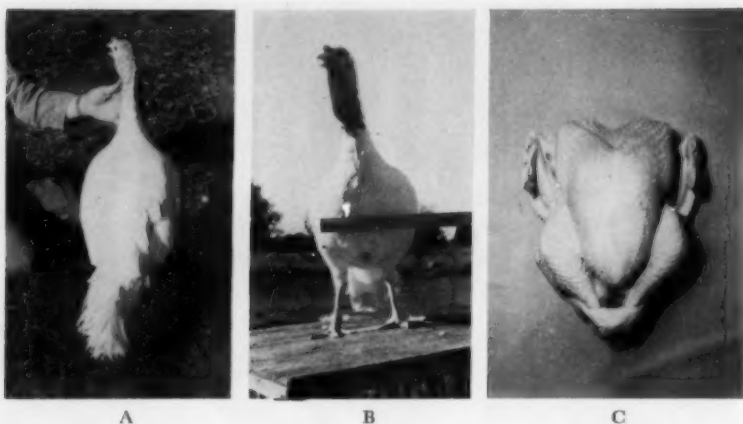


Figure 7. The new Empire White has become one of the better meat type varieties.

A. Note the symmetry and refinement as well as the general ruggedness and breadth of back.

B. Front view of the same rugged-refined hen in A.

C. Carcass of hen in A and B at the end of the breeding season. Though lacking somewhat in flesh and finish, it still shows excellent type.

those kept that would grade AA if full-finished and dressed.

The breast should be broad (at least 5 inches) and well rounded throughout the length of the keel. The breast muscles should extend well in front of the fore end of the keel bone and above it, giving the appearance of flatness or even concaveness as the bird lies on its back. This appearance of fullness must be due to muscular development and not to a lack of depth of body. Selection for the extremely flat breasts without regard to depth of body tends to develop shallow bodies. This, in turn, may result in poor fertility. A shallow-bodied bird will, like a thin-breasted one, be a disappointment to the consumer in the amount of meat that

can be carved from the carcass.

Birds with breasts that are extremely wide at the front but taper to a point at the rear to form a triangle make poor carcasses and should be discarded. The term "broad breasted" is a catchy phrase, but it comes far short of being a complete description of the best meat-type turkey.

The legs should be strong, sturdy, set well apart and of moderate length. A large thigh well filled with flesh down to the hock is indicative of a good meat animal. The legs, however, should not be coarse nor set so far apart as to cause the bird to walk ungainly. Good carriage is essential in all breeding animals, especially males. "Good carriage" is, however, relative. For ex-

ample, "game cock carriage" is neither expected nor desired for meat-type turkeys any more than "hackney horse carriage" is desirable in draft or race horses.

Breeding birds should be symmetrical and uniform as to size, shape, and color of plumage. Extremely large, coarse, slow-maturing birds should be discarded as should

too small, overly refined birds that lack meat type.

Special care should be exercised in selecting breeding toms. The keel should be moderately long, straight, free from knobiness, and fully fleshed throughout its entire length. The body should be relatively massive yet symmetrical. The legs, feet, and toes must be sturdy, straight,



Figure 8. A carcass similar to the one shown in figure 7, fully fleshed and finished, but showing a slight dressing defect on right front of breast. Note depth, width, and full fleshing both front and rear of keel.

and strong in order to carry the weight of the body easily and gracefully.

Discard those that tend to pitch forward, waddle like ducks, or show other signs of awkwardness. Also discard all those with long legs and narrow bodies and those that stand too upright as they move about. Those that stand upright are liked by wild turkey breeders, as such birds are better able to run and fly and thus escape their enemies, but they do not produce high-quality market progeny.

The good breeding tom should give the impression of power and grace.

Physical Characters

Most breeding turkeys in New York and over the entire country are selected on the basis of their physical characters only. This means that just prior to marketing time, the turkeys are caught and examined individually, and those toms and hens that are of the desired type are kept for breeders and the others are sold for meat. When this system is followed, the different hatches should be kept separate so the birds of different ages may be identified at the time of selection, otherwise the younger individuals will be unduly handicapped when compared with the more mature ones.

A few more painstaking persons make two or more selections a year. For example, the most vigorous and rapid-growing individuals are select-

ed at about 16 to 20 weeks of age, and the choice ones are marked or separated from the others. These choice ones are handled again at market time and those that have failed to develop and finish as expected are marketed, while the best ones are kept for breeders. While progress can be made by this method, it is limited, relatively slow, and uncertain because there is no record of reproductive ability, and some birds of excellent type do not transmit their good characters to their offspring. Then there exists some degree of incompatibility between extreme meat type and reproductive ability. Nevertheless, some excellent strains have been developed by this most common method of selection.

A pair of calipers of the type used by shoe clerks is an excellent tool for measuring prospective breeders. It tends to eliminate the guess as to whether or not a bird has a well-developed body throughout. This method first used by George A. Jeffreys, a turkey breeder of Calcium, New York, has since been used by the Beltsville Station in Maryland and by several agricultural experiment stations throughout the country. One objection to the use of specific measurements as a guide in the selection of breeders is the tendency on the part of some to overemphasize the measurable factors and to ignore those that cannot be easily measured with calipers. It is also too slow for general use on practical breeding farms.

Young or Old Turkeys

Young turkey hens usually lay more eggs than older birds. The older birds, however, lay larger eggs and produce larger poults that may be stronger when first hatched. But, as with other classes of poultry, the vigor of the poults and their ability to make rapid and economical growth depend upon the inheritance of the parents together with their physical condition and development rather than with whether they are from old or young parents. By using well-matured pullets, as good results may be obtained as with older stock. On the farms that raise turkeys for the regular market it is advisable to sell all the old birds after the first hatching season, and to keep only the young and well-matured ones. Special breeding farms usually keep some of the best ones for another season.

Older toms have the disadvantage of being less active than younger toms and, because of their weight, are likely to tear and injure the hen. Older toms that have proved their value as breeders may, however, be kept as long as their fertility remains high. But, when old toms are used, their toenails and spurs should be trimmed.

The age of the tom may influence the number of females to be kept with him. From 10 to 12 females may be put with a young tom, and from 8 to 10 with second-year toms.

Systems of Mating

Flock Mating

Flock mating simply means putting selected hens and toms together and permitting them to mate indiscriminately. When large numbers of breeders are flock mated, they are usually separated into groups of from 100 to 500 and managed as so many different flocks. Toms may fight, causing casualties, interference of mating, and lowered fertility. These problems are partially solved by erecting blinds part-way around the feeders. Tall feeders may also function as blinds when arranged in an L shape, or in parallel rows with passageways between the feeders every 10 or 20 feet. These passageways are usually staggered. If mass mating is done and if no records are being kept, it is advisable to separate the toms into two or more equal groups, and to rotate the groups between the breeding pens and the male quarters. Some breeders change the toms once a day and others once a week. Once a day usually is preferred. When the rotation plan is followed, the male quarters should be out of sight of the breeding pen and as far away as is practical so that the toms will rest and eat while confined. Once the male groups are formed, the individuals of each group should be kept separate from the individuals of other groups, to reduce the amount of fighting.

When it is desirable to stay with-

in the blood lines of a particular flock without too close inbreeding, the birds of a flock (both males and females) may be divided into four or more equal groups, and each group designated by color names as "blue," "red," "white," and "yellow." The individuals of each group are banded to correspond in color with the names of the group; that is, the individuals of the "blue" group wear blue leg bands, and so on. A system of toe punching of the poults is then worked out so the offspring of each group may be identified. Each year "blue" males may be mated with "red" hens; "red" males with "white" hens; "white" males with "yellow" hens; and "yellow" males with "blue" hens. As previously indicated, this permits one to keep within a single flock and yet prevent close inbreeding like brother to sister, parent to offspring, and the like.

Single-Tom Pen Mating

This system of mating, once fairly common on some of the better farms, is now seldom used. It consists of heading small 12-hen pens with a single tom. If records are kept, this system is definitely superior to mass mating and can give some useful information on the reproductive abilities of the toms used without the trouble of trapping the hens. The poults from the different pens must of course be hatched separately and marked to retain their identity.

Progeny Testing and Family Selection

The most rapid, the most accurate, and the best breeding system known today is the progeny test and family selection system of breeding. It is also the most painstaking and expensive. The required equipment for doing the job is considerable and expensive. It requires a lot of time and labor to keep and to evaluate each individual's record and considerable judgement to make up the breeding pens. This system is not recommended for the rank and file of poult producers. But those breeders who want the best, who desire to make a worthwhile and lasting contribution to the industry, and those who have the facilities, the courage, and the patience to carry the work through may find satisfaction in the results obtained.

By this system, the hens and the males are individually banded and one male is mated with a pen of from 10 to 12 hens. The hens are trapped and each egg numbered with the mating band number of the hen that laid it. Each hen's eggs are incubated in separate pedigree baskets and each poult is wing banded to retain its identity. When a poult dies, is culled, or disposed of, its wing band is recorded with an explanation of its disposal. At the time of each selection, each wing-banded poult may be graded as to market quality and the grade recorded. Therefore, by this system



Figure 9. Grading turkey eggs for hatching. The measure of quality in turkey eggs is the number and quality of poults that may be hatched from them. The appearance is of less importance than with chicken eggs because turkey eggs are seldom sold for food.

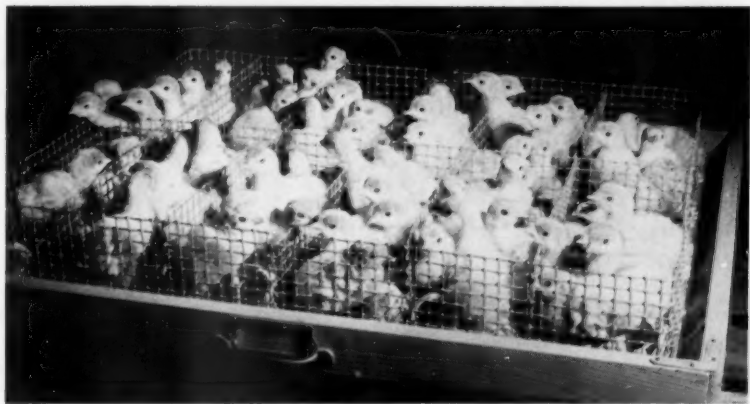


Figure 10. A good hatch of quality poults. Note the fluffiness, alertness, and the round bright eyes.



Figure 11. Taking off a hatch at the Cornell turkey research farm. Each poult is weighed, graded, and the information recorded. (Cornell Turkey Research Farm.)

one has a check on the number and hatchability of the eggs produced, and on the vigor, viability, rate of growth, and maturity of the poults, as well as a check on any other characteristics that might indicate the value of each male and female used as a breeder. These records show which toms and which hens have been able to produce large numbers of offspring and to transmit at least some of their good characters to these offspring or progeny.

One misleading argument sometimes offered against the progeny-testing system of breeding is that the following of it usually results in loss of meat type. This will happen if the progeny selected for breeding are chosen on the basis of the number of poults produced

only. The reverse will be true when progeny are selected on the basis of meat type only. Rigid requirements must be set up and adhered to for both meat type and reproductive ability. Another argument is that too many birds of good meat type and reproductive ability do not transmit these characters to their offspring. It should be always remembered that individual birds' records are less indicative of the progeny's breeding potentialities than is the average record of the individuals and the sibs (brothers and sisters). The progeny of high-record individuals of poor families are poorer risks than are the progeny of average individuals from a high-record family.

The progeny-testing and family-

selection system of breeding when followed year after year will help the breeder to develop and to locate those families that have the inherent characters for good body type, rapid and economical growth, high egg production, high fertility, high hatchability, good viability, and the ability to transmit these characters to their sons and daughters.

If the following practices are carefully carried out and if reasonably good judgement is used in making up the breeding pens, inherent improvement in body type, feathering, and reproductive ability may also be expected. There may be temporary "set backs" from time to time due to mismanagement or errors in judgement in making up breeding

pens, but over a long period of time some measure of success is almost sure to be attained.

1. Without reference to the reproductive records of the parents, weigh and grade each identified poult at 8, 12, 16, 20, and 24 weeks of age, rating each as 1, 2, 3, or 4 for body type and 1, 2, 3, or 4 for feathering, and record these ratings in the permanent records.

2. At 20 to 24 weeks, remove to separate fields or lots the poult that have the highest average rating throughout the growing period. The toms and hens should of course be separated at or preferably before the twenty-fourth week.

Following this twenty-fourth-week handling, study the reproductive records of the parents of these



Figure 12. Grading young birds is an important part of breeder selection. Those selected for breeders must have good type and good feathering throughout the growing season, as well as good reproductive family records.

selected poults and cull (no matter how good the type) those whose parents or whose parents' sibs lack good reproductive records. In these selected groups there should be about 25 per cent more females and from 30 to 40 per cent more males than will be needed for the breeding pens. Observe the birds carefully day by day and "cull" those that do not seem to quite fit with the rest of the group. Uniformity is important. Observe the males very critically and remove any that tend to show poor legs, feet, carriage, or other undesirable characters.

Feeding and Managing Breeders

Feeding

Breeder ration

A good hatching egg is a fertile egg that contains in the correct proportions all the protein, carbohydrates, fats, minerals, vitamins and, in fact, all the nutrients except oxygen that are necessary for growth and development of the embryo during the 28-day incubation period. Feeding breeders an adequate ration enables them to store a balanced ration in the egg for the future growth and development of the embryo. The nutritive content of the breeder ration also influences the livability and the rate of growth of the poults the first two or three weeks of their lives. Hence a palatable ration containing enough of all the nutritive requirements of the breeding turkeys is essential for the

maximum production of good hatching eggs.

In selecting a ration, one should of course consider both its initial cost and efficiency. But since a hen uses only about 100 pounds of mash and grain during the breeding season, only palatable and high-potency mashes can be used economically. The cost per ton of feed is not so important as the feed cost per hatchable egg or per livable poult produced.

Most turkey producers of this State use commercial rations or, at least, commercial mashes. This is usually advisable because most are adequate for fair to good results, but perhaps few give maximum results without some supplements. Most, if not all, turkey breeding rations are still too closely based on the better-known nutritive requirements of chicken hens than on those of turkey hens.

Turkey mashes mixed at home or in local mills may be as efficient as commercially mixed mashes and may cost somewhat less per ton. But, regardless of where the mash is mixed, it should be mixed thoroughly and should be made up only of ingredients of known high-quality.

All mashes should contain enough protein, vitamins, and minerals to supply the needs of the breeding birds when consumed in the proportions of 2 parts of mash to 3 parts of grain.

New information relative to tur-

key nutrition is being continuously acquired. To make this information available to turkey producers, a stencil (No. 208) has been prepared and is revised annually. This may be obtained free of charge by writing to the Department of Poultry Husbandry at Cornell University, Ithaca, New York.

Methods of feeding

Good feeding practices as well as good rations are essential for good results, and good feeding means far more than simply filling the feed hoppers with mash and grain. Good feeding means getting the birds to eat a relatively *large amount* of feed of the *correct proportion* of mash and grain *each day*.

To be a good feeder one must have considerable knowledge of the feeding habits of turkeys in general and of the particular birds for which he is responsible. He must be ever alert and observant, for the feeding habits of one flock may vary from that of another and even the same flock may vary from time to time.

Some general feeding practices that may be followed are given in the following paragraphs but these will not eliminate the necessity for alert observance and promptness of action to meet situations as they arise.

The breeding hens should be continued on the grower ration (grower mash and grain) until 6 or 8 weeks before egg production starts, when the grower mash should

be replaced by the breeder mash. These young hens having been accustomed to having both mash and grain available in open hoppers at all times during the growing season consume from three to four times as much grain as mash. During this pre-breeding period is a good time to change their feeding habits so they will eat a greater proportion of mash to grain. This is important because the mash contains most of the proteins, vitamins, and minerals that are essential to egg production and hatchability. This may be done by gradually reducing the amount of grain fed. The grain may be restricted by letting the grain hoppers become empty once in awhile or by feeding grain once a day, 1 or 2 hours before the birds go to roost, and in quantities that leave only small amounts in the hoppers for the next morning's feeding. But the change should take place very gradually to prevent any loss in total feed intake. The young hens must continue to gain in weight and should carry plenty of fat when egg production starts.

The total feed intake should increase as the egg production period approaches. If restricting the amount of grain materially reduces the total feed intake for more than two or three days, more grain should be fed and the change in diet brought about more gradually. There is usually a natural tendency on the part of hens to increase the proportion of mash to grain intake

in the ration just prior to and as egg production starts.

When an average good breeder mash is being fed with a grain mixture of corn, wheat, and oats, hens of the large varieties in high production will consume from 4 to 5 pounds of feed per hen per week. About 60 per cent of this ration should be mash or pellets and 40 per cent grain. Though there is usually no need for alarm unless the mash intake falls below 50 per cent, or more than 75 per cent, of the entire ration. A large total intake of ration is essential, and the easiest way to obtain this is by a trial method of feeding both grain and mash. When the right proportion of mash and grain can be maintained by this method of feeding, it is to be recommended. But care must be taken; if too little mash is being consumed, immediate action should be taken to induce a greater intake of mash.

Stirring the mash by running the hands through it as the eggs are gathered every 2 or 3 hours or the addition of very small amounts of fresh mash tends to intrigue the curiosity of the birds and to increase consumption.

Wet mash feeding is an old "standby" to encourage greater mash intake. Wet mash may be prepared by wetting the regular mash to a crumbly mass with water, 9 parts of water to 1 part of molasses, with liquid skim milk, or with dried or condensed milk dissolved in water. With the milk, the propor-

tions of 9 parts of water to 1 part of dried milk or 7 parts of water to 3 parts of condensed milk are satisfactory. The feeding of wet mash is not only an excellent way to increase the mash intake but is a good way to add supplementary amounts of vitamins D, A, or other supplements as needed. It should be used only when needed and fed in quantities that will be consumed in about 30 minutes. It must be fed at a regular time each day, usually between 1 and 2 o'clock in the afternoon. It is advisable to empty the nests prior to or just after feeding the wet mash so that as many hens as possible can have a chance at it.

In general, turkey breeder mashes are formulated for hens of average productive ability. But there are few if any mashes high enough in potency for hens that maintain an average production of from 80 to 85 per cent for a period of a few months. Hence it is often necessary to supplement the ration. For example, if the shells show a tendency toward weakness, extra vitamin D may be needed. An adequate and readily available supply of fresh clean oyster shells should of course be provided at all times. Experimental evidence indicates that medium to heavily mottled turkey eggs hatch better than those with little or no mottling, and observations indicate that good mottling is in part dependent upon the amount of vitamin A in the ration.

It should be remembered that the chief purposes of the wet mash is

(1) to encourage a greater total feed intake, (2) to increase the proportion of mash to grain, and (3) it may be used as a carrier for needed supplements.

The breeding toms should be separated from the market birds as early as is practical and so fed that they may continue their growth and development without becoming excessively fat. They may have free access to both mash and grain, but the grain mixture may consist chiefly of oats or barley, and wheat, with a limited amount of corn. The toms must be big broad-breasted birds capable of carrying a lot of flesh if one expects to obtain the kind of poults desired. They must be strong and vigorous and carry good fleshing, but excessive fat may result in clumsiness and loss of fertility in the breeding pens.

Putting the toms by themselves also provides an opportunity for daily observations to find any defects overlooked while selecting or any that may have developed since selection.

After the potential breeders have been selected, it is most important to provide a safe place for them where they can be protected from predators and where they cannot remix with the market birds. Providing them with roosts after their selection as well as during the growing period tends to retain suppleness of muscles and hence to decrease clumsiness. It is surprising how much time is lost by carelessly letting the two groups get together,

necessitating rehandling. Birds also lose weight and some are crippled each time they are handled. Unless adequate fields or lots are available, it may be advisable to place the birds in their permanent breeding quarters early in the season, though leaving them on green range until just before winter is preferred when it is practical to do so.

A clean and readily available supply of water should be before all the birds at all times. The temperature of this water should not be permitted to go lower than 50°F. Certainly, it should never be permitted to freeze. Dry or frozen fountains will result in a reduction in egg production quicker than will empty feed hoppers.

Managing

One of the first steps in breeder management after the potential breeders have been selected is to decide which toms will be mated with which hens. In other words, the breeders and their pen numbers are listed on paper; but the males and females are kept in separate quarters until three or four weeks before hatching eggs are desired.

Placing the breeders in pens

Getting the quarters ready is of extreme importance, and every detail should be taken care of before the potential breeders are brought in from the range. This change with its accompanying change in ration (lack of green forage) is drastic at best, hence every effort should be

made to reduce the shock as much as possible. The litter should be on the floors and all roosts, nests, and broody coops in good repair. There should be as little hammering and repairing as possible after the birds are in their pens. All the feed hoppers, grit and shell hoppers, and water containers should be filled and in their regular places. Nesting material should be in the nests and the young hens should be permitted in and out at will during the day so as to become accustomed to the nests prior to the start of lay. This tends to lessen the number of floor eggs later on. Nest perches that close the nests when raised should be provided. The birds should not be permitted in the nests nor on the nest perches at night. Turkeys are habit-forming creatures, hence good habits formed early saves much labor and expense later on during the season.

Placing the hens in their respective quarters is a job that must be done very carefully. These hens are "expectant mothers" and should be handled as such. When possible, one should drive rather than carry the flock mating birds into their quarters. It may be advisable to give them a few days to get settled and gentled before blanketing; but if they must be caught and carried in, it is advisable to blanket them before they are released, thus preventing the necessity of further handling and frightening at a later date.

Getting the pedigree and prog-

eny test birds into their winter quarters is a much bigger and more detailed operation than the one just described. After the operator has spent many days in studying blood lines and production records to decide which birds go into each pen, it is necessary that they be so placed. When possible, only high-quality help should be used for this work and the birds should not be hurried. Mistakes made here must be corrected and the correction will be expensive in loss of time and further disturbance of the birds.

The breeding pens will have already been made up on paper before starting to bring the birds in. The wing band numbers of the birds to be used should be listed alphabetically on a work sheet and opposite each the number of the pen into which the bird goes. Each pen should be designated by letter or number and such letters or numbers conspicuously placed on the door of the pen.

In the experience of the author, the following method has been satisfactory. First, turkey crates are lettered or numbered to correspond to the pedigree pens or compartments. These crates are arranged near the field catching rack into which the birds are driven. As each bird is taken from the catching rack the wing band number is read aloud. The individual handling the work sheet finds the number, places a check mark (✓) after it and announces the pen into which it goes. If it goes into pen B, it is placed

in crate B, and so on. The crates are carried into the respective pens and the birds are released. This system minimizes the amount of handling and is reasonably though not entirely fool-proof. Some errors may still be made and, if so, should be corrected promptly. As soon as the pens are completed, the individual birds should be blanketed and leg banded with the current year's mating band.

Lights

For early eggs, artificial lights may be used on the males, usually from two to four weeks, depending upon their ages, before they are placed with the breeder females and from four to six weeks before eggs are to be saved for hatching. The younger the toms, the longer they may need lights to stimulate sperm production. This pre-lighting period seems to be more necessary with immature young toms and aged toms than with well-matured young toms. Either morning, evening, or morning and evening lights may be used. It is usually best to start with a 12-hour day and to increase the time about 30 minutes a day until the maximum of 15 hours is reached. All-night lights with small bulbs appear to give equally good results. The young hens are not given light until the toms are placed with them in their mating pens. Then the lights are used as they previously have been with the males.

There is still some disagreement

among research workers as to the necessity for longer lighting periods for toms than for hens. But, until further information is available, the practice seems to be justified—especially for aged and immature toms when early season eggs are desired. It is probable that little or no pre-lighting will be needed for well-matured young toms used to head breeding units that do not start production before April or later. Then the males and females may be placed together and lights started at 2 or 3 weeks before the eggs are to be saved for hatching.

Preventing preferential mating

In general, turkeys are more or less polygamous, that is, the males and females mate indiscriminately without preference for individuals. But there are enough exceptions to be of economic importance. Some hens exhibit a definite preference for certain males and refuse to mate with others. The economic importance of this tendency is increased by the fact that the turkey hen, rather than the male, initiates the mating action. The tom indicates his willingness by strutting and by throwing one wing over the backs of the hens, but unless these hens show their receptiveness by squatting in front of him, no mating takes place. Flock matings with a number of toms in the flock usually solve this problem, as each hen has a wider choice of individuals to choose from. But this problem of preferential mating may be a scri-

ous problem when the individual pen system of mating is followed. Some hens are likely to prefer a tom in an adjoining pen and to refuse to mate with the male heading their own pens. This preference is indicated by their squatting near the partitions separating the pens, and by the toms in the adjoining pens strutting up and down along their side of the partition. These hens should be promptly transferred to the pens containing the toms of their choice, and the mating records adjusted accordingly. It is usually possible to identify and transfer these hens during the first week or two.

Other practices

Getting the breeders off to a good start is of the utmost importance. This is especially true for single-tom pedigree matings. Starting when the toms are first placed in their respective pens, the caretaker should be relieved of all other duties and should practically live with the breeders for the next week or two.

Most toms are fertile and most are able to mate after just a few attempts. The caretaker should go from pen to pen as he hears matings start and should observe these attempts and record results. If he studies his records as he makes his observations, he should be able to evaluate the toms as breeders within a week or two after mating starts. Any tom that is unable to mate due to immaturity or to awkwardness

should be replaced. It is not always easy for an inexperienced caretaker to differentiate between an attempted copulation and a successful one, hence an experienced person may need to work with an inexperienced one for a day or so. This task should never be assigned to one satisfied with doing careless or slipshod work. Should a considerable number of toms appear to have difficulty in completing copulations the fault probably lies elsewhere rather than with the toms.

For an example, one year a group of toms appeared to have difficulty completing copulations. It was discovered that the hens' blankets were about 2 inches too long. Two inches were removed from the rear ends of the blankets and the average flock fertility for the entire season was more than 90 per cent. The old-type blanket is too long in proportion to its width for the new meat-type hen.

Trapnest hens lose credit and the owner loses money on each egg that is laid on the floor instead of in the trapnest. An egg found on the floor cannot be safely recorded as having been laid by any particular hen, therefore, if clean, it must be used as a flock egg which is usually worth about one-half as much as a pedigree egg. Floor eggs are likely to be soiled and dirty and then they are total losses. The floor-egg problem to be successfully prevented or solved must be done just prior to and at the start of lay. Permitting the hens to go in and out of the

nests at will for two or three weeks before they start to lay should prevent most of the trouble. Watching the hens to determine the offenders and the time of day for lay soon enables the caretaker to catch the offenders and to place them in the trapnests before they lay. When this is done consistently for just a few days at the start of lay, the hens form the habit of going into the nests to deposit their eggs. Once the habit of laying on the floor has been established it is extremely difficult to break.

Some other mismanagement practices that tend to cause the trouble are too few or too inaccessible nests, lack of roosts in the pens, failure to open nests early enough or regularly enough in the morning, closing them too early or too irregularly at night, irregularity in turning lights on or off, and rough handling and frightening of birds as they are removed from the nests.

Caring for the broody hens is another phase of turkey management where timing is all important. When broody individuals can be identified and cared for immediately, the broodiness may be checked and the hen brought back in production within a week. But it is not always easy to diagnose broodiness promptly and definitely. The symptoms are not so definite and clearcut as with chicken hens. The usual symptom is ruffling of the feathers and a tendency to peck when the caretaker gathers eggs.

But more important is the tendency to stay on the nest even at night. Some hens may, however, display most or all the signs and continue to lay fertile eggs. In this work one must use his best judgement, which should continue to improve with experience. All broody hens should be fed and watered with the same care as others, to prevent loss of flesh and long periods of non-production. Broodies from the flock may be thrown in with spare toms. These toms will not permit them to sit long at a time and this terminates the broodiness. Hens from the pedigree pens should be removed and placed in slot- or wire-bottom coops. Since the tendency for broodiness is inherited, persistently broody hens should be removed or marked so their offsprings will not be saved for breeders.

Hatching eggs

The eggs should be gathered at least four to six times a day, to prevent freezing, heating, or other exposure that would adversely affect their hatchability.

They should be stored in a cool room (about 55°F.) that has good ventilation and a relative humidity of 65 to 70 per cent. They should be turned once a day after the second or third day, and should be incubated within a week or ten days. The conditions under which eggs are held are, however, probably about as important as the length of time they are held. Hatching eggs should be selected for quality as in-

MOTTLING

BROAD-BREADED BRONZE

228 HENS - 5,957 EGGS

WHITE HOLLANDS

296 HENS - 10,113 EGGS

PERCENT

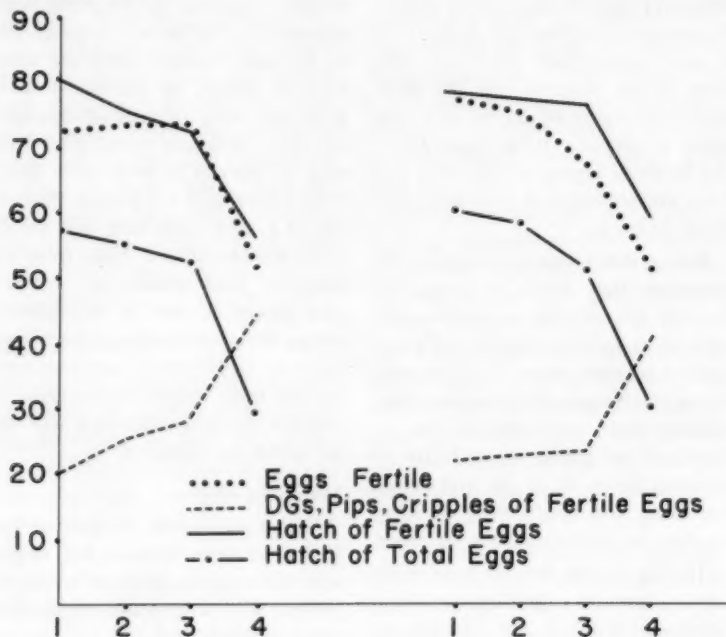


Figure 13. Mottling in relation to fertility and hatchability—Broad-breasted Bronze and White Holland turkeys, 1947, 1948, and 1949.

SHELL TEXTURE

BROAD-BREADED BRONZE

WHITE HOLLANDS

228 HENS - 5,957 EGGS

296 HENS - 10,113 EGGS

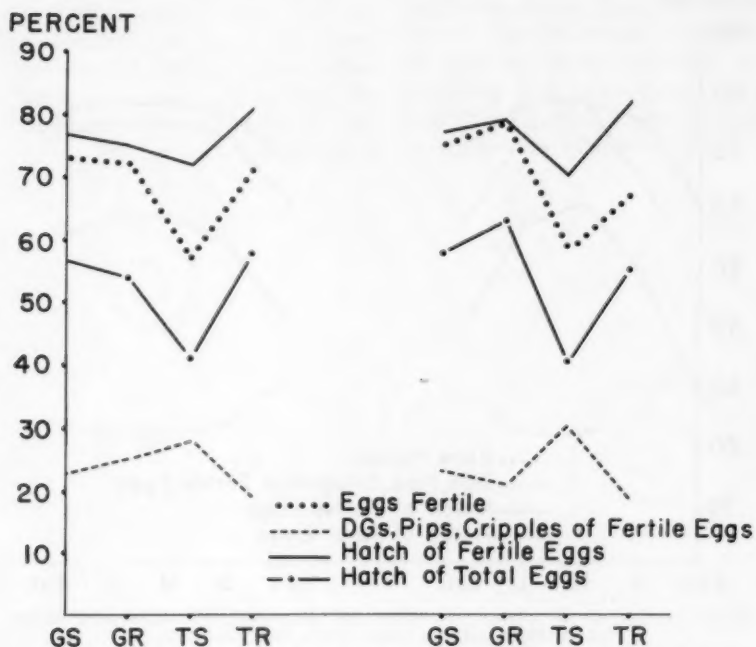


Figure 14. Shell texture in relation to fertility and hatchability—Broad-breasted Bronze and White Holland turkeys, 1947, 1948, and 1949.

EGG SIZE

BROAD-BREADED BRONZE
228 HENS - 5,957 EGGS

WHITE HOLLANDS
296 HENS - 10,113 EGGS

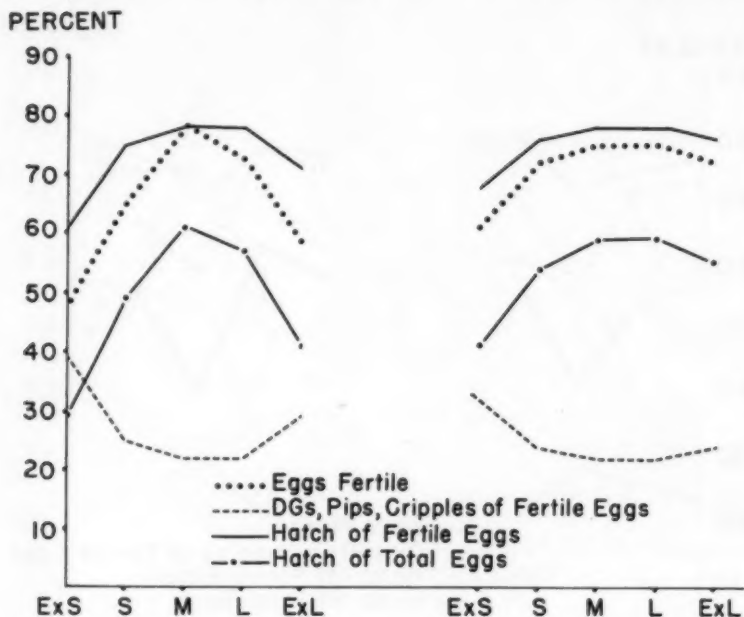


Figure 15. Egg size in relation to fertility and hatchability—Broad-breasted Bronze and White Holland turkeys, 1947, 1948, and 1949.

formation becomes available as to what constitutes quality and what indicates quality. But there is no need to waste good eggs on the basis of arbitrary standards that have neither practical experience nor controlled experimental data for their foundation. Egg-quality standards for chicken eggs are not necessarily applicable to turkey eggs, because their chief functions are different. But turkey eggs should be

selected on size, shape, shell texture, and mottling (figures 13, 14, and 15). The extremely large and the extremely small eggs, also misshapen eggs and those devoid of mottling should be discarded. They do not hatch well. In a study of the relation of shell texture to fertility and hatchability the writer was surprised to find that those with smooth shell did not give so good results as those with rough shells.

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